What Is Claimed Is:

1. An image processing device for fluorescence observation comprising:

an image synthesizing section that generates a synthesized image by synthesizing an image signal of a reflected light image produced by illumination light obtained by illuminating body tissue with illumination light and an image signal of a fluorescent image obtained by illuminating the body tissue with excitation light; and

a gain adjustment section that adjusts the gain of the image signal of the reflected light image and/or the image signal of the fluorescent image such that the boundary of the hues of the normal tissue and the diseased tissue found using the optical characteristics of the respective tissues is included in a predetermined range with respect to a prescribed standard chromaticity diagram, depending on whether the body tissue that is represented in the synthesized image generated by the image synthesizing section is normal tissue or diseased tissue.

2. The image processing device for fluorescence observation according to claim 1, wherein the image signal of the reflected light image comprises an image signal of a first reflected light image obtained by illuminating body tissue with illumination light of a wavelength band

including the optical absorption band of hemoglobin and an image signal of a second reflected light image obtained by illuminating the body tissue with illumination light of a wavelength band including the optical non-absorption band of hemoglobin;

the image synthesizing section synthesizes the image signal of the first reflected light image, the image signal of the second reflected light image and the image signal of the fluorescent image; and

the gain adjustment section adjusts at least one gain of the image signal of the first reflected light image, the image signal of the second reflected light image and the image signal of the fluorescent image.

3. The image processing device for fluorescence observation according to claim 2, wherein the image synthesizing section synthesizes the image signal of the first reflected light image, the image signal of the second reflected light image and the image signal of the fluorescent image as respectively different hues.

4. The image processing device for fluorescence observation according to claim 1, wherein

the image signal of the reflected light image comprises an image signal of a first reflected light image obtained by illuminating body tissue with illumination light of a wavelength band including the optical absorption band of

hemoglobin and an image signal of a second reflected light image obtained by illuminating body tissue with illumination light of a wavelength band including the optical non-absorption band of hemoglobin;

the image synthesizing section performs synthesis with the first reflected light image allocated to a red color, the second reflected light image allocated to a blue color and the fluorescent image allocated to a green color; and

the gain adjustment section adjusts the gain of the three image signals such that the boundary of the hues of the normal tissue and diseased tissue represented in the synthesized image is included in a range defined by the four points (0.21, 0.53), (0.18, 0.50), (0.23, 0.44) and (0.25, 0.49) with respect to the CIE 1976 UCS chromaticity diagram.

5.   The image processing device for fluorescence observation according to claim 1, wherein

the image signal of the reflected light image comprises an image signal of a first reflected light image obtained by illuminating body tissue with illumination light of a wavelength band including the optical absorption band of hemoglobin and an image signal of a second reflected light image obtained by illuminating body tissue with illumination light of a wavelength band including the optical non-absorption band of hemoglobin;

the image synthesizing section performs synthesis with

the first reflected light image allocated to a blue color,

the second reflected light image allocated to a red color

and the fluorescent image allocated to a green color; and

the gain adjustment section adjusts the gain of the

three image signals such that the boundary of the hues of

the normal tissue and diseased tissue represented in the

synthesized image is included in a range defined by the four

points (0.21, 0.53), (0.18, 0.50), (0.23, 0.44) and (0.25,

0.49) with respect to the CIE 1976 UCS chromaticity diagram.

6.   The image processing device for fluorescence

observation according to claim 1, wherein the boundary of

the hues is the point of intersection in the respective

probability distribution functions obtained based on the

average color tone of pixels in regions of interest that are

set in regard to body tissue and diseased tissue,

respectively.

7.   The image processing device for fluorescence

observation according to claim 4, having a normal image mode

for generating an image signal of a normal image obtained by

successively illuminating body tissue with light of red,

green and blue color produced from white light.

8.   The image processing device for fluorescence

observation according to claim 5, having a normal image mode

for generating an image signal of a normal image obtained by

successively illuminating body tissue with light of red,

green and blue color produced from white light.

9. The image processing device for fluorescence observation according to claim 2, wherein the illumination light of the wavelength band including the optical absorption band of hemoglobin includes 550 nm wavelength.

10. The image processing device for fluorescence observation according to claim 2, wherein the illumination light of the wavelength band including the optical non-absorption band of hemoglobin includes 610 nm wavelength.

11. An image processing device for fluorescence observation comprising:

image synthesizing means that generates a synthesized image by synthesizing an image signal of a reflected light image produced by illumination light obtained by illuminating body tissue with illumination light and an image signal of a fluorescent image obtained by illuminating the body tissue with excitation light; and

gain adjustment means that adjusts the gain of the image signal of the reflected light image and/or the image signal of the fluorescent image such that the boundary of the hues of the normal tissue and the diseased tissue found using the optical characteristics of the respective tissues is included in a predetermined range on a prescribed standard chromaticity diagram, depending on whether the body tissue that is represented in the synthesized image

51

generated by the image synthesizing section is normal tissue or diseased tissue.

12. The image processing device for fluorescence observation according to claim 11, wherein

the image signal of the reflected light image comprises an image signal of a first reflected light image obtained by illuminating body tissue with illumination light of a wavelength band including the optical absorption band of hemoglobin and an image signal of a second reflected light image obtained by illuminating the body tissue with illumination light of a wavelength band including the optical non-absorption band of hemoglobin;

the image synthesizing means synthesizes the image signal of the first reflected light image, the image signal of the second reflected light image and the image signal of the fluorescent image; and

the gain adjustment means adjusts at least one gain of the image signal of the first reflected light image, the image signal of the second reflected light image and the image signal of the fluorescent image.

13. The image processing device for fluorescence observation according to claim 11, wherein

the image signal of the reflected light image comprises an image signal of a first reflected light image obtained by illuminating body tissue with illumination light of a

wavelength band including the optical absorption band of hemoglobin and an image signal of a second reflected light image obtained by illuminating body tissue with illumination light of a wavelength band including the optical non-absorption band of hemoglobin;

the image synthesizing means performs synthesis with the first reflected light image allocated to a red color, the second reflected light image allocated to a blue color and the fluorescent image allocated to a green color; and

the gain adjustment means adjusts the gain of the three image signals such that the boundary of the hues of the normal tissue and diseased tissue represented in the synthesized image is included in a range defined by the four points (0.21, 0.53), (0.18, 0.50), (0.23, 0.44) and (0.25, 0.49) with respect to the CIE 1976 UCS chromaticity diagram.

14. The image processing device for fluorescence observation according to claim 11, wherein

the image signal of the reflected light image comprises an image signal of a first reflected light image obtained by illuminating body tissue with illumination light of a wavelength band including the optical absorption band of hemoglobin and an image signal of a second reflected light image obtained by illuminating body tissue with illumination light of a wavelength band including the optical non-absorption band of hemoglobin,

the image synthesizing means performs synthesis with the first reflected light image allocated to a blue color, the second reflected light image allocated to a red color and the fluorescent image allocated to a green color, and

the gain adjustment means adjusts the gain of the three image signals such that the boundary of the hues of the normal tissue and diseased tissue represented in the synthesized image is included in a range defined by the four points (0.21, 0.53), (0.18, 0.50), (0.23, 0.44) and (0.25, 0.49) with respect to the CIE 1976 UCS chromaticity diagram.

15. An image processing device for fluorescence observation comprising:

a light source that emits illumination light consisting of two different wavelength bands, a wavelength band including the optical absorption band of hemoglobin and a wavelength band including the optical non-absorption band of hemoglobin, and excitation light in a wavelength band for exciting fluorescence;

an image pickup section that picks up respectively two reflected light images produced by the reflected light obtained by reflection after illuminating body tissue with illumination light of the two different wavelength bands from the light source and a fluorescent image produced by fluorescence excited by illuminating the body tissue with the excitation light from the light source; and

an image processing section that generates a processed image by signal processing of the image signals of the two reflected light images obtained by image pickup by the image pickup section and the image signal of the fluorescent image;

wherein the image processing section comprises:

a signal input section that inputs three image signals consisting of the image signals of the two reflected light images picked up by the image pickup section and the image signal of the fluorescent image;

an image synthesizing section that generates a synthesized image by image synthesis of the image signal of the wavelength band including the optical absorption band of hemoglobin, the image signal of the wavelength band including the optical non-absorption band of hemoglobin and the fluorescent image signal; and

a gain adjustment section that adjusts the gain of the three image signals that are input by the signal input section such that the boundary of the hues of the normal tissue and diseased tissue represented in the synthesized image synthesized by the image synthesis section is included in a range defined by the four points (0.21, 0.53), (0.18, 0.50), (0.23, 0.44) and (0.25, 0.49) with respect to the CIE 1976 UCS chromaticity diagram.

16. The image processing device for fluorescence

observation according to claim 15, wherein the image synthesizing section effects synthesis by allocating one of the two reflected light images to a red color, allocating the other to a blue color and allocating the fluorescent image to a green color.

17. The image processing device for fluorescence observation according to claim 15, wherein the image synthesizing section effects synthesis by allocating one of the two reflected light images to a blue color, allocating the other to a red color and allocating the fluorescent image to a green color.

18. The image processing device for fluorescence observation according to claim 15, wherein the boundary of the hues is the point of intersection in the respective probability distribution functions obtained based on the average color tone of pixels in regions of interest that are set in regard to body tissue and diseased tissue, respectively.

19. An image processing device for fluorescence observation comprising:

a light source that emits illumination light consisting of two different wavelength bands, a wavelength band including the optical absorption band of hemoglobin and a wavelength band including the optical non-absorption band of hemoglobin, and excitation light in a wavelength band for

exciting fluorescence;

an image pickup means that picks up respectively two reflected light images produced by the reflected light obtained by reflection after illuminating body tissue with illumination light of the two different wavelength bands from the light source and a fluorescent image produced by fluorescence excited by illuminating the body tissue with the excitation light from the light source; and

an image processing means that generates a processed image by signal processing of the image signals of the two reflected light images obtained by image pickup by the image pickup section and the image signal of the fluorescent image;

wherein the image processing section comprises:

signal input means that inputs three image signals consisting of the image signals of the two reflected light images picked up by the image pickup section and the image signal of the fluorescent image;

image synthesizing means that generates a synthesized image by image synthesis of the image signal of the wavelength band including the optical absorption band of hemoglobin, the image signal of the wavelength band including the optical non-absorption band of hemoglobin and the fluorescent image signal; and

gain adjustment means that adjusts the gain of the

three image signals that are input by the signal input section such that the boundary of the hues of the normal tissue and diseased tissue represented in the synthesized image synthesized by the image synthesis section is included in a range defined by the four points (0.21, 0.53), (0.18, 0.50), (0.23, 0.44) and (0.25, 0.49) with respect to the CIE 1976 UCS chromaticity diagram.

20. The image processing device for fluorescence observation according to claim 19, wherein the image synthesizing section effects synthesis by allocating one of the two reflected light images to a red color, allocating the other to a blue color and allocating the fluorescent image to a green color.

21. The image processing device for fluorescence observation according to claim 19, wherein the image synthesizing section effects synthesis by allocating one of the two reflected light images to a blue color, allocating the other to a red color and allocating the fluorescent image to a green color.

22. The image processing device for fluorescence observation according to claim 19, wherein the fluorescence wavelength band is a wavelength band including 520 nm wavelength and the two reflected light bands are wavelength bands comprising respectively 550 nm wavelength and 600 nm wavelength.

23. The image processing device for fluorescence observation according to claim 22, wherein the wavelength width of the two reflected light bands is no more than 20 nm.